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REPORT

OF

SURVEYS MADE FOR A

THROUGH TRAFFIC RAILWAY

FROM THE

MIDDLE AND SOUTHERN

ANTHRACITE COAL FIELDS,

OF PENNSYLVANIA,

TO NEW YORK BAY.

UNDER THE DIRECTION OF

R. A. WILDER.

SEPTEMBER, 1868.

PRINTED BY BANNAN & RAMSEY,

POTTSVILLE, PA.

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REPORT.

MR. B. BANNAN,

Dear Sir :—In accordance with your expressed wishes, and the desire of several gentlemen prominently connected with mining and other important interests in this County, I assumed the charge of surveys for a railroad leading directly from this coal region to the seaboard near New York.

You have long been the able and consistent advocate of such a road, and as the present movement is mainly due to your exertions, it is proper for me to address this report to you.

In the early part of March, I placed a corps of engineers on the route contemplated, who prosecuted the work of preliminary examinations, with occasional interruptions from inclement weather and other causes, till the terminus on New York Bay was attained near the close of July.

The object of these surveys being to determine the practicability of constructing a through traffic railroad, which will accommodate the greatest area of coal producing lands by the shortest distance consistent with favorable grades and alignment, no attempt has been made towards a final location, as neither the time nor means at my disposal, would have warranted this course; but the line surveyed, having been carefully selected, can be rapidly revised and prepared for construction, whenever it is desirable to place the work under contract.

As authority to use the present system of lateral railroads has been granted by the Legislature, no surveys were made within the coal area to reach the mines; but even if this authority did not exist, from my intimate acquaintance with the topography of the coal region, I have no hesitancy in saying that every important colliery can be approached by

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another road, without particularly interfering with the interests of other companies, except to take away a portion of their trade, or compel a reduction of their charges for transportation. Besides it is probable that very important changes will gradually be introduced in the mode of mining and preparing coal for shipment, which will necessitate great changes in the location of some of the lateral railroads and sidings. The existing laterals are as well adapted to the present operations as any that could be constructed, and as they are strictly coal roads, encumbered with very little way business, they could be made portions of a through traffic system of transportation without inconvenience to any one. Coal passing over them designed for the way trade of other lines, would diverge from the one under consideration at the point where the through trains would be made up, hence no detentions would occur from this cause.

The route from the coal region to the seaboard will be considered under three divisions; the first embraces the country between these coal fields and the Lehigh River, and constitutes the one of greatest immediate interest to this locality, because it can be easily constructed, and will afford early relief to our languishing coal trade; besides being within the finanical ability of the business men of this county, for if they have not the ready money to invest in such an enterprise, they possess property of exceeding value on which funds can be realized, and, what is not often the case in such operations, the application of the means thus obtained will enhance the value of the property pledged beyond its indebtedness, so that the sum invested in the road is an actual gain to the owner.

The second division extends from the mouth of Lizzard Creek, eight and a half miles below Mauch Chunk, to the Delaware River near Easton. The presence of three lines of improvements in the Lehigh Valley renders this portion of the work more difficult and expensive; but the impediments met with are not insurmountable, nor beyond a reasonable expenditure for so important a work.

The third division embraces examinations between the Delaware River and Perth Amboy, and other points on the

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coast of New Jersey. The unbroken range of hills a few miles east of the Delaware, known as the Muskonetoung Mountain, presents a formidable barrier to a direct line to the coast, and a new road must necessarily run nearly parallel to the Central Railroad of New Jersey, or pass through the mountain with a tunnel. Partial explorations down the river from Easton to a point near Milford, N. J., and thence across the country to the Raritan River north of Flemington, indicate a route which presents many favorable features, and further careful explorations may determine it to be the best of those examined.

FIRST DIVISION OF SURVEYS.

Before determining the general course to be pursued in making these surveys, I examined the data in my possession, collected from careful instrumental explorations of several routes made under my direction at different periods, as well as those of others who had been employed on surveys for similar purposes.

There are three principal routes to the Lehigh Valley which have their advocates in this region; the first is the one via. Tamaqua and Mahoning Creek; the second is the Lizzard Creek route, and the third, the Auburn and Allentown route. The last named was carefully examined by the writer, with a view to its purchase by the Mine Hill and Schuylkill Haven Railroad Company, sometime before it passed into the control of the Philadelphia and Reading Railroad Company. The line was found to be well located, the grades favorable for a heavy coal tonnage, with desirable connections for a way business and mixed traffic, but the cost of the work, nearly two millions of dollars for a single track and partial equipment, was beyond the means of its projectors, or those who were asked to purchase and finish it, and it was finally permitted to pass into the hands of the Reading Company, who were anxious to prevent its construction, where it has remained for eight or ten years a monument to blighted hopes and disfigured farms.

The Tamaqua route was surveyed under the direction of

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the writer in 1865, from the Phœnix Park Colliery on the West West Branch to a point east of Tamaqua, where it connected with a line previously run through the Mahoning Valley, from the Lehigh River. The examinations embraced the ground near the southern base of the Mine Hill, at an elevation much higher than most of the collieries, and therefore very difficult to work; the line of the Schuylkill Valley Railroad, and the intermediate district, distinguished by a succession of high ridges and deep ravines. Neither of these lines were deemed practicable in a commercial sense, and nothing further was done in that direction. The average grades were very objectionable, and in either case the line would have been a very costly one to construct, owing to the remarkable topographical features of the country; besides the height of the line above most of the coal operations along the route, would necessitate the use of inclined planes, or branches with steep ascents, to reach the main road from each colliery. No calculations can safely be made of the cost of working such a line, except they are based upon the results obtained from carefully kept accounts and long experience.

A glance at the topography of this coal district, will show that the mountains and the valleys are parallel, and that the distance to New York by either of the routes named is about the same, so that the Tamaqua line has no advantage in this respect, and in all others its inferiority is manifest.

From the foregoing considerations, and having once before located and partly constructed a line down the Lizzard Creek Valley, I was induced to select it as the most favorable route for the present surveys. There are no private interests to bias my judgment in this selection, but it has been governed by a comprehensive view of all the advantages to be gained in the construction of a new outlet, embracing the whole of this great coal field, which may have connections with Western and Southern roads, at the most favorable points for an extensive through traffic.

The initial points of the first division of surveys are at Mount Carbon, connecting with the system of lateral roads in the valley of the east branch of the Schuylkill River, and at a

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favorable place of connection with the Mine Hill and Schuylkill Haven Railroad near Beck's tavern, in the West Branch Valley; the junction of these lines is a short distance north of the "Waterloo Locks," thence the line runs eastward, north of the Centre Turnpike and Spring Garden, through the County Farm, near the Alms House enclosures, and following the base of the slate ridge, which forms the northern boundary of the Orwigsburg Valley, to the summit at Hummel's, where it takes the north slope of limestone ridge to Pine Creek, passing to the south of the ridge through the gap and following it to Moyer's summit, thence in nearly a direct line to the Little Schuylkill River, which it crosses near Weaver's mill south of Ringgold, thence following the valley of Bachert's run to the gap below Bachert's farm, through which it passes to the north side of the ridge and continues to Wertman's summit, which forms the dividing ridge between the Schuylkill and Lehigh rivers. Here the line enters the valley of Lizzard Creek, and descends to the Lehigh along the north slope of the same limestone ridge as the one encountered near Hummel's summit.

Connections were made with both the Lehigh Valley, and Lehigh and Susquehanna Railroads at favorable points for the accommodation of a large traffic, if it should ultimately be deemed most advisable to construct only this division, and throw the products of this coal region upon the lines of transportation already existing there. It is not improbable that this will be done, if either of the companies should hold out sufficient inducements to take the trade and dispense with a further expenditure of capital.

That portion of the line between Mount Carbon and the Little Schuylkill, a distance of thirteen and two-tenths miles, presents the only difficult work to be encountered; and this is not unusually expensive. The short branch connecting with the Mine Hill Railroad, will require an embankment averaging twenty feet in height for a distance of one thousand feet across the West Branch Valley, and one of forty feet in height over the East Branch Valley, a distance of eight hundred feet. There is also a cut through the narrow ridge dividing the streams, of forty-two feet in depth, but the

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length of this is only three hundred feet, and the quantity of material to be removed consequently small. A bridge one hundred feet long will span the West Branch, and one of one hundred and twenty feet in length will pass the East Branch, and a trestle work of about the same length will be required over the Schuylkill Canal and Centre Turnpike. The line from Mt. Carbon to the connection of the branch road, is not difficult to construct, except at the spurs of the second mountain near the upper portion of the gap, where future examinations must determine the character of the work to be done. Proceeding eastward from the junction, the work is generally light except at Eiler's run near Spring Garden, where the approach from the west will require heavy excavation; the valley is narrow, and will be crossed with trestle work of considerable elevation; the exact altitude cannot be given until the final location is made. From this place to the summit east of the County Farm, the work is very light and the line generally free from curvature; the summit is passed with a cutting of moderate depth, but nearly half a mile in length; this heavy work is compensated by freedom from expensive construction for several miles. At Pine Creek the valley is crossed at an altitude of nearly sixty feet, but the work beyond is very light till the summit at Moyers' is attained, where heavy excavation will be required to reduce it to the grade line; from there to the Little Schuylkill River the grading is inexpensive. At the river a bridge one hundred and twenty feet in length will be required, and the valley will be crossed by trestlework; between this point and Wertman's summit, the grading is light except at one or two places for short distances. From Wertman's summit to the Lehigh, a distance of nearly fifteen miles, the grading is very light, not being much more than what is necessary to level the road bed and secure proper drainage.

The distance from Mt. Carbon to the Lehigh is thirty-three and two-tenths miles, and the short branch connecting with the Mine Hill Railroad, is five-eighths of a mile in length, making a total of less than thirty-four miles of railroad to be constructed to connect the lines of transportation in the

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Lehigh Valley, with all the lateral railroads and coal improvements of the Western Coal Fields, which embrace nearly two-thirds of the whole Anthracite Region of Pennsylvania. Only a fractional portion of this work can be regarded as expensive, and the whole cost of construction is entirely within the means of our landowners and operators, or of either of the owners of the Lehigh improvements. There are but three bridges of any importance on the line, neither of which will require to be of more than one span of less than ordinary dimensions, and as two of them will be connected with trestlework of considerable elevation, they will be deck bridges, and only require common supporting masonry.

As the speed of trains will be limited to six or eight miles an hour, trestlework may safely be substituted for embankment at all points where the material for filling is not furnished from necesssary excavations, or is difficult to be obtained. The trestling can be built of prepared lumber, so as to render it durable and nearly fire-proof, and the plan of construction can be such as to permit all needed repairs without interference with the movement of trains. Whenever the affairs of the company will allow it, permanent structures may take the place of all temporary work; but there will be no danger of interruptions to a well-organized movement over timber-work as here proposed, and the first cost of the road will be materially lessened, as the heaviest earthwork will be dispensed with, and the time required in construction will be shortened several months; besides it so happens that the heavy fillings, where timber work is proposed to be substituted, are at points where the grades are light, and no danger can be apprehended from accelerated speeds in passing these structures.

GRADIENTS.

The maximum grades ascending eastward, and consequently against the coal trade, are twelve feet per mile from the initial points to Hummel's summit; then the road descends forty feet per mile to Pine Creek, to reduce the

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height of embankment in crossing the valley; from here the grade to Moyer's summit is twelve feet per mile; from the summit to the Little Schuylkill the line descends at the rate of forty feet per mile. To reduce the present cost of construction and secure a favorable connection with the Little Schuylkill Railroad, or any other line which may be constructed there, it is deemed advisable to use auxiliary power in the movement of maximum trains as far as Wertman's summit, a distance of five and a half miles, and the grade on this portion is established at forty-five feet per mile; from this summit to the Lehigh River, a distance of about fifteen miles, the road descends with grades varying from ten to thirty feet per mile.

It is practicable to cross the valley of the Little Schuylkill at any elevation which would reduce this grade to twelve feet per mile, but it would be attended with an expenditure so great, that the interest on the capital required would be more than the cost of auxiliary power; besides at the altitude necessary to secure the lower grade, it would require a long and expensive connection with any road in the valley. One locomotive of the same construction as those employed to run through, would assist ten trains of one hundred and twenty cars each (four wheel) per day over this part of the road. As the grading will not be expensive, but little loss will result from its abandonment, whenever the road is crowded with tonnage which will render it more profitable to work the lower grades at the heaviest expenditure of capital; a contingency which will surely arise in the operations of this through traffic line. It is not necessary to enter here into the calculations which govern this, but it is susceptible of as clear a solution as any other problem in railway economy. As the distance to the Lehigh, from the points where trains will be made up, is such that an engine can easily make the round trip and double the part where auxiliary power is needed, moving half the train at a draft so that no other expense would be incurred in hauling twelve hundred cars per diem with ten engines, than the additional cost of fuel and stores in moving the extra draft five and a half miles.

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There are many ways of performing this service by the division of labor among the engines in regular service.

It will be seen that I have treated this subject as though the extent of run for the trains was between this region and the Lehigh Valley. If the road should be continued to the seaboard as now proposed, the trains would run through to the wharves of the company, and the extra work of reaching the summit of this heavier grade would add about one hour to the round trip, which would be a trifling expense in labor of engine and crew, and a small addition to the charge for maintenance of way. The actual cost of auxiliary power at this point would be a little less than one cent per ton on 2,500,000 tons.

Our surveys will require revision before an accurate estimate of the cost of this division can be made; but as we have the estimates of the Schuylkill Haven and Lehigh River Railroad, which was partially built by the Mine Hill Railroad Company in 1863, and as the line under consideration runs nearly parallel with that, and upon similar ground, a very close approximate of the cost can be arrived at.

The engineers' estimates for that road were in the aggregate $565,160, and the work was let to responsible contractors below that sum. The distance from the terminus of the Mine Hill road, near the crossing of the Philadelphia & Reading Railroad at Schuylkill Haven, to a connection with the Lehigh Valley Railroad, near the mouth of Lizzard Creek, is thirty and a half miles; the above estimates covered this length of single track and five and a half miles of double track and sidings. The extention of our line to Mt. Carbon, and the short branch to connect with the Mine Hill Railroad, will add about $100,000 to the above estimate, which together with the enhanced value of labor and material, will make an aggregate of $800,000, as the cost of a line affording direct communication from every part of this and adjoining coal districts with New York. These estimates include a short branch connecting with the Little Schuylkill Railroad below Ringgold, thus giving an outlet for all the products in the vicinity of Tamaqua, by a line not much longer than the one via Mahoning Valley. If it is desirable to construct a

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road independent of the Little Schuylkill, a branch can be located, starting from near Bolich's Mill, so as to make the distance from Tamaqua less than by any other route.

The foregoing estimates include masonry and earthwork at all the deep valleys where trestle work may be safely substituted, for trains moving at the rate of six or eight miles per hour; if this is done, a reduction of about $50,000 can be made in the first cost of the work, so that the amount necessary to be raised for the construction of this division will be only $750,000, a sum certainly within the reach of the owners of property worth at least $50,000,000, and which would be increased in value not less than thirty per cent. by the construction of a new road; an amount of increase equal to the whole cost of a double track road to New York, and a full equipment to operate it. If the work of constructing this division is vigorously prosecuted by the owners of property here, the present carrying companies in the Lehigh Valley will be willing to furnish every facility for receiving the tonnage passing over it upon terms mutually beneficial; or if the stockholders prefer, they can continue the line to tide water, and thus have the control of an independent road for the transportation of their products to the eastern markets.

As this division is the link wanting in the chain of direct communication between the western portion of the Anthracite coal fields and New York, it is of more immediate interest to the people than either of the others, and more space has been devoted to it than can be allotted to them. Much of what is said respecting this line is likewise applicable to the other divisions, and it is therefore unnecessary to repeat the remarks when treating of their characteristics.

SECOND DIVISION OF SURVEYS.

This line extends from the mouth of Lizzard Creek to the Delaware River at Easton. It passes down the west side of the Lehigh River to a point just below the gap, where the river breaks through the Blue Mountain; here, in order to avoid the projecting slate ridges which entail heavy work,

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it was deemed advisable to cross the stream and proceed down the east bank in the vicinity of the Lehigh Navigation Company's works to a point below Allentown, where the valley is re-crossed, and the line, for the remaining distance, is laid on the west side of the river, nearly parallel to the Lehigh Valley Railroad.

The ground is already occupied by three lines of improvements, and the construction of another will be attended with some difficulty and heavy expense, compared with the work of the first division. The most serious obstructions are met with as the line approaches the Delaware; the valley is narrow and occupied with two railroads, one canal, several manufactories, and the village of South Easton. A careful examination of the situation presents, however, an easier solution of the problem than at first appears. The road, if built that far, will be used as a through traffic ~~train~~, and space for two tracks only will be required, which can be obtained without much detriment to existing improvements. The length of this division is thirty-seven and a half miles, and I estimate the cost of its construction for a single track, including double track for passing places, at fifty-three thousand dollars per mile, making the aggregate cost of this division $1,987,500.

In a through traffic business, the movement of all trains is arbitrary, consequently the tracks for passing them may be located at points where the grading is least expensive, and it is not probable that more than two such places will be needed on this division.

No connections with other roads being necessary to its success, and no impatient public to be looked after and appeased, the schedules of running on this line will be made to suit the trade, and in order to keep the loaded trains down to a uniform slow speed, and still do the greatest amount of work that a single track road is capable of doing, the light, or return trains will be moved at higher speed between passing places so that they only will lay over, and the loaded cars continue on without stopping. This system of working will add greatly to the capacity of a single track road, without increasing perceptibly the wear and tear of track and

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rolling stock. The reduction of maintenance of way, and expenses of rolling stock is sure to follow the diminution of speed, and if the business of a line can be confined to one class of operations no difficulty will be in the way of running trains in any desired manner.

If it should be decided to build this division, careful topographical surveys of this valley should be made to determine the best and cheapest line; there is no part of railroad construction which pays so well as the expenditure for preliminary engineering, and this is especially the case here where the ground is already largely occupied with improvements of a similar character. The opinions here expressed will doubtless be considerably modified by further examinations, but it is hoped they will be found sufficiently correct to establish the practical value of the work under consideration.

GRADIENTS.

The grades of this division are mostly descending at the rate of from five to twenty feet per mile eastward favoring the coal trade. There are few points where the descent is greater than from five to ten feet per mile, and these for only short distances. On no part of this division will the application of brakes be needed to check the speed of trains, a feature of great importance to the economy and safety of working a coal road where the trains are generally of such great length as to preclude a view of all parts at one time. The grades ascending westward are of course the same per mile as the descending grades eastward, and admit of the movement of heavy return trains. On all portions of the whole line care has been taken to adjust the grades so that an engine can haul back more empty cars than it can take of loaded ones in the direction of tide-water. This will allow sufficient margin for certain kinds of heavy freights, required for use at the collieries, to be taken in coal cars for distribution in the coal region.

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THIRD DIVISION OF SURVEYS.

This line connects with the second division at the Delaware River, and crosses the State of New Jersey to Perth Amboy on Raritan Bay. The country for a few miles east of the river, is deeply indented by three considerable streams, which render portions of the work expensive to construct if it should be decided to adopt either of the two first routes examined; but the most formidable impediment to a favorable location here is the "Muskonetoung Mountain," a wide range of hills without any considerable depression from New Hampton to the Water Gap, eight miles below Easton. There are several deep gorges in both the north and south faces of the mountain between the points designated, produced by small streams heading far up the sides, but none of them have lowered the crest line to any considerable extent.

There are three methods of overcoming this obstacle; the first is to follow the line of the Central Railroad of New Jersey through the gap at New Hampton; the second to pass the mountain at the gap below Easton; and the third, to approach some one of the gorges with a bold location, and effect the object by tunneling the hill. Either of these methods are practicable, but it is difficult with the present data to determine which of these lines will be best suited to a through traffic road. The object to be attained by each is to get to the Raritan River where descending grades or levels may be employed to reach the seaboard. The length of this division is about fifty-seven miles, and may be reduced in a final location to less than fifty-five miles if the tunnel line is adopted.

Some portions of the work on this line will be very heavy while other parts are very light; the average for the whole distance will be below that of most roads in this State. I estimate the cost of a single track with the necessary room for passing trains at fifty thousand dollars per mile, or $2,750,000 in the aggregate. Here, as on other portions of the road, trestling may be substituted for heavy embank-

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ment, which will reduce the present cost of construction below the above estimates. It will be understood that no real estate other than for the roadway will be needed along the line of this division for use of the coal traffic, and none is included in the foregoing amount. At the terminus of the route, room for sidings, engine houses, lands, &c., must be had, but these may belong to another corporation as well as to the railroad company, and consequently they are not embraced in the expense of constructing the road.

GRADIENTS.

It is very important on a coal or heavy traffic road to lower the grades encountered in the movement of freight as much as possible on the whole distance, so that maximum trains can be run through without division or change of motive power. Economy of working requires that whatever adverse grades encountered should be brought to one point if practicable, when auxiliary power can be employed to overcome them in a short run. The dividing ridge between the waters of the Delaware and Raritan is at no place but a few miles from the former; when this is attained the coast is reached by a long descending slope following the general course of the streams, over which the largest trains can be taken with a single first-class engine.

The grades by the New Hampton route are from eighteen to twenty-three feet per mile to the summit; but the distance, sixteen miles, is greater than desirable for the employment of assisting engines to overcome the elevation, and the face of the country examined does not permit the levels of the second division to be extended beyond the Delaware in this direction so as to shorten the run of auxiliary engines by adopting steeper grades; further examinations may develop this, but our notes indicate its impracticability for the most desirable plan of working.

The gradients of the tunnel route admit of adjustment to suit the working by assisting engines; the distance from the river to the tunnel will be nine miles, and the auxiliary power will be used on the greater portion of this distance. The length of this run is greater than desirable, but it is

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little more than half the distance to New Hampton, and the cost of motive power for working it will not much exceed the rate per mile of that line; the expense of auxiliary power here will be about two cents per ton on a business of 2,500,000 tons.

The route down the river and passing through the gap of the Muskonetoung avoids the difficulty of the adverse grades referred to, but encounters others in ascending the slope to the east of the river. The distance here, however, is very short and well adapted to the use of auxiliary engines. The intervening country, from the summit of this first slope to the Raritan north of Flemington, has not been explored sufficiently with instruments to determine the exact character of the grade, but enough is known to show that it will not exceed that of the first division, viz: twelve feet per mile. It is to be regretted that the means at my disposal did not admit of a careful instrumental survey of this district, because it presents features, which at no distant day, will make it one of the most important thoroughfares through the State. In addition to the traffic it would receive from the Lehigh Valley, large accessions to its tonnage would come from a road extending into the interior of Pennsylvania through Leibert's gap in the South Mountain, and connecting with some of the most important railways now in operation, and yet to be constructed.

It is apparent to any one familiar with railway operations that neither the Morris and Essex Railroad, nor the Central Railway of New Jersey, have a favorable location for a through heavy traffic. They were originally intended to accommodate a local business, and were extended to meet the expanding wants of the community. The latter company has been managed with marked ability in securing by liberal concessions the convergence upon its road of the business of two important railway lines, having connections with the north and west, and draining the products of a large portion of the Anthracite Coal Fields of Pennsylvania. The grades on both of these roads are unfavorable for the economical movement of heavy coal and freight trains, and there seems to be no method of improving either line in this

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respect to the required extent. The rapid growth of the country between New York and Easton, and in the valley of the Lehigh, will furnish profitable employment for both roads in carrying passengers and local freight, so that the construction of another line for a through traffic business cannot depreciate the value of either. Every interest demands that coal, which is the great primary power of so many branches of industry, and dispenses its countless blessings widely among the humble poor as well as the rich of the land, should have the cheapest transit which skill and energy can provide. Many millions of tons of this fuel are annually distributed at the seaboard to supply the wants of a large and growing population, vast manufacturing enterprises, the United States Navy, and the immense fleet of ocean and other steamers. Between the shipping port and mines the charges should be reduced to meet as far as practicable the public demand for cheaper transportation.

Under the present system of moving heavy trains, no great reduction can be expected; by radical changes only, can this desirable object be accomplished, and the most important of these is the classification of railway service, and the entire separation of the product of our mines, seeking tide water, from all local freight, and fast passenger and express business. This view of the subject leads to the consideration of

THROUGH TRAFFIC ROADS.

An opinion prevails among many men of the largest experience in railroad management, that where circumstances will admit of it, through traffic roads should be constructed and operated on the basis of cheap transportation for the common benefit of all. There are few localities where this can now be done, because the industrial pursuits of nearly every district are of a diversified character and conducted on the principle of interchange of products, and frequent intercourse between producers and consumers, requiring roads where passenger and freight trains are constantly intermingled.

The movement of trains on roads of this class must nec-

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essarily be attended with greater expense in the aggregate, than would be the case if uniformity in speed, equipment, and other characteristics could be preserved throughout; because if there be but a single train per diem run at thirty miles an hour every condition of the track, bridges, turnouts, equipment, and police must be fully up to that standard, or life and limb will be in constant jeopardy. Transportation of the prime necessaries of life, or the great staples for consumption in domestic arts and manufactures, upon such roads are subjected to a rate of charge which seriously conflicts with the interests of producer and consumer; but the past history of nearly every railroad in this country, as well as most of the European lines, shows that the net profits of the capital invested, are less than the earnings of most other kinds of business. It is true that the income of nearly all the roads in the loyal States during the late war was very large, and enabled many of them to relieve themselves from serious financial embarassment. In many cases it was a greater injury than benefit both to the companies and public, because it lead to many extravagancies, ambitious projects and high charges, that most of them find it exceedingly difficult to recede from, now that the industries of the land are prostrated, in many instances by the very causes which enriched the companies, and clamor for reductions in the charges for transportation of their products.

Most of the large corporations are seeking by mergers, consolidations, and leases of the weaker lines, to obtain control of the carrying business and keep up prices. That this is their object, must be apparent to any one conversant with the subject; for it is impossible to find an instance where a movement of this kind has resulted in a reduction of freight or passenger charges. This tendency to centralization of railway power is working greater evils to the industrial pursuits of the country than appears to the casual observer; and the only way to meet and check the abuses growing out of these practices, is to organize a combination of interests among producers and consumers, for the purpose of building cheap freight lines wherever practicable.

It is the useless extravagancies of the management which

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absorbs the earnings and leaves the stockholders without a dividend. In many cases, neither the President nor Directors are acquainted with any of the details of working a road. They are placed in power because they will become willing tools to aid in building a "corner," or digging a "pool," where any number of "bulls" or "bears" are to break their heads or be engulphed. The public, for whose benefit these highways are supposed to have been first created, is entirely ignored by these men, whose only remembrance of it is manifested by an extra turn of the screw at the right time, to squeeze out another dollar in aid of some stock jobbing operation.

The time is not far distant when a great through traffic line will be in successful operation between the Atlantic cities and the far West, and it is likewise highly probable that this classification of the service of railroads will result in the construction of a great through passenger and express line between the same points, with strength and perfection of track and equipment to meet the reqnirements of a speed of forty to fifty miles per hour, at all seasons, and under all circumstances, with the greatest security to life, limb and property. Under the present system of operating roads, there is a constant liability to accident, some of them too terrible for humanity to contemplate. These catastrophes would never be heard of if proper judgment were exercised in the general management of the lines, by keeping the speed of trains below the limit of strength of track and rolling stock. Where it is possible to work a road at speeds of from six to eight miles per hour, it ought to be done for the benefit of the public and stockholders.

The Anthracite Coal Fields of Pennsylvania present a locality peculiarly adapted to the construction of a through traffic road for the transportation of its products, which are principally consumed in the territory lying to the east of them, or are distributed at the seaboard to the various markets on the Atlantic coast and in the interior of New England. The quantity of coal taking this direction is so great now, and constantly increasing with accessions to population, and the growth of all kinds of manufacturing establishments, that

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the period for changes in the system of transportation of heavy freights has arrived, and the method herein suggested may safely be relied upon as the wisest and best for all concerned. The aggregate tonnage from all the anthracite coal districts which went to the seaboard in 1867 was about 9,000,000 tons of the 12,650,571 tons sent to market, and the average cost of its movement over the trunk lines now in use was nearly double of what it could be carried for over a road constructed and operated on the plan of a through traffic business.

A trunk line laid in the valley of the Lehigh, and connected with all the laterals of the coal region by well constructed branches, and extending to the nearest coal port on the coast of New Jersey by a direct line across the State, having suitable working grades, will accommodate all the coal trade at minimum charges. A glance at the accompanying map will show that the Lehigh Valley occupies the most favorable position for access to all parts of the anthracite coal region, and that the lines of surveys here presented are probably the best for the purposes contemplated.

If satisfactory arrangements can be made with the owners of either of the lines now constructed and operated there for mixed traffic, to convert their roads, or a portion of them sufficient for the purpose, to the use of a through traffic business, the great object can be accomplished in less time, and without detriment to investments already made. No one can desire the destruction or injury of any of the great lines of internal improvements, which have aided so materially to develop the districts penetrated by them; but on the other hand the owners of such improvements should be ready to meet all the reasonable demands of the public for cheaper rates of transportation, through rigid economy or improved systems of working. If they are unwilling to do either, they should stand aside and let others undertake it.

The alignment and grades of the existing roads are favorable for a heavy tonnage, as far as the Delaware River; from this point to the seaboard, better lines than the Central and Morris & Essex Roads can be obtained, and as the former is now well up to its capacity, and the latter out of the question

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as a heavy freight road, a new railway adapted to the intended objects with improved gradients, would be of the first importance in the system under consideration. If the Legislature of New Jersey should refuse the necessary authority to construct such an avenue across her domain, the Congress of the United States, under the constitutional right to regulate commerce between the States, ought to convey the corporate powers for such purpose. Cheap railway communication between the interior States and seaboard, is a matter that interests all the people of this country, and if one State interposes its petty authority to bar with monopolies a free passage, with reasonable restrictions, the supreme power of the land should sweep them from existence.

From the summit of the Broad Mountain to the Delaware, a distance of nearly eighty miles from the Mine Hill Railroad planes, there are but fourteen miles of twelve feet grades against the Eastern traffic. From the summit of the Wilkesbarre Mountain, at the head of the Lehigh Navigation planes to the Delaware, the distance is about eighty-five miles, by both the Lehigh & Susquehanna and Lehigh Valley Roads, with no ascending grades against the trade. The adverse grades of the Central Railroad are twenty-three feet per mile at numerous points, reducing the number of cars to a train about one-third below the load which can be moved over the proposed line. The importance of reducing the grades from the Delaware to the seaboard, is therefore clearly seen, and a heavy expense may safely be incurred to accomplish the purpose. To pass maximum trains over so long a distance as a hundred and thirty miles without change of motive power, or division at the river, with the aid of auxiliary power for a few miles only, will effect a great reduction in the expense of working the road.

Any point on the coast of New Jersey, easy of access, and convenient to the great commercial center, for the purpose of procuring water transportation at minimum charges, can be made the central depot for all the coal of the Anthracite regions seeking a market by tide-water. Port Johnston has great depth of water and abundant room for wharves and sidings, but the distance by rail is greater, and the approaches

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across Newark Bay are expensive and liable to frequent interruptions. Elizabethport has no advantages superior to points farther down, and probably Perth Amboy is the most conveniently situated for all purposes, as a mere coal depot. It is not so far from the wharves of New York as to make any difference in the charges of vessels on that account, and they can go to sea from that as well as from any other port.—The depth of water at Perth Amboy is ample for the class of vessels which usually carry coal, anything beyond that would be useless if secured. Many objections will no doubt be urged against this place as a coal port by interested parties, but they should have no weight unless proven by well grounded facts.

The wharves ought to be erected by the railroad company and all coal handled by them with a view to economy and dispatch. It is usually said that individuals do work cheaper than companies, and this may be true to a certain extent, but it is only because those to whom the interests of the company are intrusted neglect their duty by not looking sharply after subordinates. Companies can work at lower rates than individuals, because they have the means to furnish facilities which the latter could not afford. The difference between corporate and private enterprises is mainly due to the relative positions of the owners; in the one instance the profits or losses affect directly the management; in the other they are divided amongst a great number of persons who never know anything of details and are generally powerless to remedy known evils.

To facilitate the working of the road and the general interests of the coal trade, a telegraph line should extend from the most eligible place in New York for a central office to the shipping port, and thence along the line of this coal road and its branches to every important colliery in the coal field. Over one wire of this line of telegraph all business belonging to the coal trade would be communicated, and the other would be used for the movement of trains and general management of the road. By its means the owner or consignee of coal would know with precision when his coal would arrive, and at what hour his vessels should be at the

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wharves for loading. At suitable points on the road tele-telegraph stations would be erected, which with a few water and fuel stations, would be all the structures needed by the company for working their road.

In the general economy to be observed on a through road, uniformity in model should be observed throughout; cars for each kind of service should be of one pattern; the locomotives should be alike, and so perfect in all their parts that one would fit another without alteration. The same rule should apply to everything entering into the construction requiring renewal. Great care must be observed in the selection of the very best plans for every purpose, and the best experts should be employed as a Board of Examiners to decide all doubtful points; but when the decision is arrived at and the company has adopted and carried out their plans, no officer of the road should be permitted to direct the change of any one of them without the knowledge and consent of the company. This matter is so important that the most stringent rules ought to govern it. It is not intended by these remarks to prevent experiments, or restrict the inventive powers of employees; but this question of uniformity of structure admits of no doubts arising to interfere with its rigid practice.

The movement of all loaded trains ought not to exceed six or eight miles per hour; the light trains on a single track road may run at higher rates between passing places, so that they may lay over for the loaded ones to proceed without interruption; the increase of tonnage that can thus be made to pass on a single track is the only thing to justify a departure from the strict rule of low speed for all trains.

It would occupy too much space to enter into all the details of working a through traffic road, or present all the arguments in favor of this system as applicable to the coal trade. That it is the most economical method of conveying the products of the mines to the eastern market cannot be doubted; any approach to the system by the present lines results in a reduction of the cost of movement, and on the other hand every additional way train placed upon them adds to the expense of conveying the great staple. On a

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through traffic road it is possible to do a large amount of way business, but it must be so conducted as not to obstruct the main track. Trains for such stations must be taken entirely from the road, switched off, and on again after the performance of the way duty, in a manner not to detain or even check a through train.

It is obvious to every one that the uninterrupted movement of heavy trains at low speeds, as here proposed, must make a great reduction in the wear and tear of road and rolling stock, and almost absolute security against accidents will be attained. Rails and wheels that would be totally inadmissable at speeds of thirty miles an hour, could be used with perfect safety at six or eight miles an hour; the same is true of all material in use upon a railroad; it is therefore very evident that the durability is greatly increased in everything employed, and the expenses of repairs and renewals reduced in consequence. To the foregoing may be added the greater destruction of property from accidents, the loss of time in laying over for fast trains and irregular movements, changes of motive power, &c. All these added together make a formidable list of extra charges, that would be unknown on a road used exclusively for the transportation of heavy freights.

The quantity of coal sent to tide-water from this region for shipment beyond Philadelphia in 1867, was about 2,500,000. The most of it went to New York and vicinity, and the New England States, and could be shipped at Perth Amboy as well as any other point. This tonnage would all take the new road if it could be transported at less rates than charged by the present lines via Philadelphia. The amount of coal sent East, by the lines converging upon the New Jersey roads from the coal district accessible to this proposed through traffic line, was about 1,200,000 tons in 1867, which added to the above makes 3,700,000 tons, a large proportion of which would be secured to the new line as soon as it could be finished for its reception.

If these views of transportation of coal and other heavy freights are correct, it must be evident that the true remedy for many of the evils now complained of by those engaged

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in the coal production of this region, will be found in the construction of such a road to the seaboard near New York. It should be built and operated under the most rigid system of economy, so that it can afford to carry coal at so low a rate as to defy competition by any of the way traffic lines. A careful examination of the whole subject will convince any impartial mind that this can be done, and yield a handsome return for the money invested.

CONNECTIONS AND EXTENSIONS.

In addition to the connections with the lateral railroads of this region, it is proposed to extend the main line to connect with the Philadelphia & Erie Railroad, via the Shamokin Valley and Pottsville Railroad, and with the great Pennsylvania Central Railroad via Tremont and Millersburg, at some favorable point on the Juniata.

The grades ascending eastward from the junction of the Shamokin Valley and Pottsville Railroad, crossing the Broad Mountain by a tunnel, will not exceed forty feet per mile, and it is probable that further surveys will show them to be much lower. There is a place on the north slope of the mountain where inclines planes with ascent adapted to the movement of stock, and general freight cars, can be erected at moderate cost, equal to a business of from fifteen hundred to two thousand tons per hour, including weight of cars. The inclined plane route will be the cheapest to construct, and in its operations will only be limited by the capacity of its hoisting machinery. The grades westward on this extension will be steeper than the ascents eastward, per mile, but they are not so high as those of the mountain divisions of some of the most prominent roads in the country.

The eastward grades from the Juniata and Susqushanna will be between thirty and forty feet per mile, and well adapted to the movement of heavy trains.

This line will connect with the Northern Central Railway near Millersburg, and by that line accommodate vast quantities of freight passing between the north and south.

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It is impossible at this time to estimate the accessions to the tonnage of our through traffic road from these three important sources. Our line to the east from the points of connection, is shorter than either of those receiving this tonnage at the present time, and by the lower rates of transportation must take all freight open to competition.

As this line will not be a competitor for passengers, or way freight, nor for any portion of the traffic to Philadelphia; and being in a condition to carry at lower rates than the roads now receiving this New York tonnage from the above sources, there appears to be no reason why it should not all naturally converge upon the "through traffic road" as a commercial necessity. There is every reason to presume that the owners of the roads referred to will be ready to enter into arrangements to carry out these objects in a spirit of liberality.

Connections will no doubt be made in the Lehigh Valley to receive a large portion of the trade seeking the seaboard from the Lehigh and Luzerne districts; but if satisfactory relations cannot be established with existing lines, it will be practicable to push this road into those coal fields and take the tonnage directly from the mines. There are favorable points for the erection of inclined planes to surmount the Wilkesbarre Mountain, and if they are made to work reciprocally the expense of operating them will be greatly reduced, and the expenditures for "back tracks". entirely avoided.

The inclined plane system for elevating coal to the summits of the mountains of the coal region, when properly arranged, and where a heavy tonnage converges upon these structures, is much the cheapest and most expeditious. If it should be eventually necessary to construct new branch roads throughout the coal region to secure the greatest portion of the trade to the through traffic line, planes adapted to the nature of the service required of them may be freely used on the north slopes of the mountains.

It is practicable to make them capable of passing both ways, six hundred four-wheeled cars per hour; that is 300 empty cars down and 300 loaded cars up the plane when the

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angle of inclination does not exceed seven degrees. Plans for such machinery have already been prepared, and the tests made show that the statement of its capacity has not been exaggerated.

These connections and extensions must contribute largely to the success of this enterprise, and at the same time confer vast benefits upon the public by giving the cheapest avenue to the market for its products that has been constructed in this or any other country.

The distance from Pottsville to Perth Amboy via Lizzard Creek and Lehigh Valley, is as follows, viz:

First division, from Pottsville to Lehigh River,	33.2 miles.
Second division, from the mouth of Lizzard Creek to Easton,	37.5
Third division, from Easton to Porth Amboy,	57.0 "
Total distance,	127.7 "

The following is an approximate estimate of the cost of the line for a through tonnage of two millions five hundred thousand tons of coal and other heavy freights per annum:

First division, from Pottsville to the Lehigh, including connections with the Mine Hill and Little Schuylkill Railroads,	$800,000
Second division, from the mouth of Lizzard Creek to the Delaware River,	1,987,500
Third division, from the Delaware to Perth Amboy,	2,750,000
Making the cost of the road from Pottsville to tide-water,	$5,537,500

To many persons these estimates may appear inadequate at the current charges for railroad work; but they will nevertheless be found ample for the purpose contemplated. There is no occasion for the costly structures often found upon modern railways; strength of material and substantial workmanship are more important than ornate finish, which can add nothing to the durability of a road. The only warrant for such expenditures is found in the laudable desire to harmonize with other structures in large towns and cities.

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The estimate for the equipment of this road for a business of two millions five hundred thousand tons of coal and other heavy freights per annum, will be nearly as follows, viz:

For Transportation.

7000 (4-wheeled) coal cars, - - - - -	$1,610,000
60 first-class locomotives, - - - - -	1,080,000
6 second-class locomotives, - - - - -	90,000
250 (8-wheeled) house and plane cars, for through merchandize traffic between New York and the coal region, - - - - - - - -	170,000
	$2,950,000

For Maintenance of Way.

5 second-class locomotives, - - - - -	75,000
Material cars of all kinds. - - - - -	137,500
Hand cars, section tools, &c., &c., - - - -	25,000
Wrecking equipment and sundries, - -	12,500
Total, - - - - - - - - -	$3,200,000

No sum has been set apart for the construction of repair shops in these estimates. As they will be of a temporary character until experience derived from actual operations, shall determine the proper location and extent of them, they have been included in the items making up the estimates of cost per mile for the construction of the road and fixtures.

What was said of the principles governing the construction of the road, is equally applicable to the manufacture of rolling stock. No ornamental work should ever attach to a freight engine or car; the design should embrace only what is strictly useful, and combine strength and durability. If care is observed in the selection of the best models, there will be but little occasion to change them to keep pace with the alterations so common on most roads, for in reality they are of much less importance than is generally supposed. The substitution of wrought iron for castings, and of steel for wrought iron will be reforms in the right direction; but this will not change the general features of the model nor the proportions of the fitting parts. Ornamental work adds to

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the first cost, and is a constant source of extra expense and labor to keep in order.

Next in importance to adaptation of design is the exactness with which the parts should be fitted up, in order that the greatest dispatch in repairs may be secured. If the engines are of one pattern throughout, portions of one will fit like parts of all the others, and if duplicates are kept on hand for emergencies, the period of service will be prolonged and the working expenses kept down; these remarks apply also to the construction of cars.

The following statement exhibits the expense in detail of delivering freight in cars at the terminus of this road, per round trip of 254.4 miles from Pottsville to tide-water, and return with empty cars.

Number of cars (4-wheeled) to each train, - - 120
Average weight of coal per cars 4½ tons of 2240 lbs.
Total weight of coal per train, - - - - 540 tons.

Calculations based upon a traffic of 2,500,000 tons per annum:

Items of expense.	No.	Rate.	Amount.
Pay of engineer, (round trip),	1	$10 50	$10 50
" " firemen, " "	1	7 50	7 50
" " conductor, " "	1	7 50	7 50
" " brakemen, " "	2	6 75	13 50
Anthracite coal for fuel—tons,	12	3 00	36 00
Kindling fuel—cords,	¼	6 00	1 50
Water supply,		1 50	1 50
Oil for machinery & lamps—galls.,	2	1 10	2 20
Grease for cars, (round trip),		5 00	5 00
Engine repairs, (per mile),	254.4	0 08	20 35
Car repairs, "	254.4	25	76 32
Conting't expenses, despatch'g, &c.,			12 00
			$193 87

Equal to 35.9 cents per ton of 2240 lbs. carried through to tide-water.

If to the foregoing charge for transportation, we add the expenses for maintenance of way and telegraph line, office expenses, superintendence and sundries, together with inter-

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est on capital, we shall have the cost of delivering a ton of coal to the shipping port by this road. A liberal calculation gives the following result:

Transportation charge (brought forward) per ton,	35 90	cts.
Maintenance of way, &c., - - - - - -	12 72	"
Office expenses, superintendence, &c., - -	2 40	"
Interest on capital at 8 per cent., - - -	27 96	"
Total cost of moving one ton of coal 127.7 miles,	78 98	"

If the tonnage should fall below 2,500,000 tons per annum, this rate would be increased; but while the market requires the coal and the charges are kept below those of other lines, this road will have all it can carry, and its business therefore can only be limited by its capacity.

By the prescribed movement of trains, there is no doubt but this amount of tonnage can be carried. It will require seventeen trains each way per day, working two hundred and seventy-two and a half days to attain it, but with uniform times of starting and regular speeds in running so as to keep all trains prescribed distances apart, and by having everything kept well in hand by careful management, the work can be accomplished at a cost not exceeding the sum before named.

If there is any doubt about this, let it be remembered that the manner of operating this road is very different from the plan now in use upon the roads having a mixed traffic, and everything must be viewed from a different standpoint. The comparative effects of fast and slow speeds of uniform and irregular movements, and all the points of variance in management must be carefully weighed before a correct judgment can be given. The road must be built for cash, and kept as free as possible from speculative influences. There are no margins for stock-jobbers and "rings" in these calculations. A range broad enough for all contingencies is found in the difference of rate now charged ($2 98 per ton to New York,) for transportation, and the estimates herein contained for delivering coal to tide-water in the vicinity of that city. The vast quantities of real estate usually owned by other railroad corporations are here dispensed with; no pro-

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perty of a character to absorb the earnings and give no adequate return, will be held by the company; and no army of servants to await the arrival and departure of two or three trains per day, will be needed at every town and hamlet along the route.

Having devoted more space to the surveys and general remarks upon construction and transportation than was at first intended, it remains to consider as briefly as possible, some of the means which can be employed towards this great work of building and equipping a through traffic road from the coal region to the seaboard.

The history of nearly all enterprises shows them to have had a local origin; the wants of individuals soon grow to be public necessities, and seek relief in the united effort of all to find a remedy, and in this way the most important public works have had their inception and grown to the proportions and perfection that distinguishes the age. Capital is more readily found to complete an enterprise than begin it, and this fact conveys to us this important truth, that while we are waiting for the capitalist to bring us relief, our condition is rapidly admitting a phase that admits of no remedy.

There are probably not less than fifty millions of dollars worth of property dependent upon the enterprise under construction of this road and equip it for service. A mortgage of the road and equipment, after the expenditure of the five millions acquired by the pledge of coal property, would give all the means necessary to complete the work, and place a magnificient avenue to the best and only reliable coal market in the country, in the control of those directly interested in the production of its tonnage. There is an objection with many to encumber their property for any purpose whatever; with others the objection is that their neighbors would be benefitted as much as themselves without lending a helping hand to the measure, and they do not feel impelled by duty or inclination to give them this benefit. To the first it may be consistently replied that it is really no incumbrance upon their property, but a transfer of value from operations now comparatively unprofitable to a new enterprise that will secure a permanent return of much greater value to the

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ERRATA.—For "admitting," in the 21st line, page 32, read "assuming."

After "under," in the 23d line, read "consideration for its profitable development, and ten per cent. of this amount would be enough to insure the"

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whole investment. To the second may be presented, if no higher motive prompts, the folly of withholding good from ourselves because others may enjoy some of the benefits with us. One thing is certain, no one can share in the earnings of the road without owning its securities.

The Legislature of this State has already granted authority under which a trust can be created to receive the pledge of coal property, and issue bonds thereon for the building of this road. If the powers already conferred are wanting in any essential feature, the desired modification can be effected at the approaching session of the General Assembly, and everything prepared for vigorous operations in the spring.

The policy of the National Administration, upon which so much affecting business relations depends, will soon be established for the next four years, and this may therefore be considered a season well adapted to preparation.

Ample powers already exist in this State for carrying forward this enterprise, and there is no doubt but authority can be obtained from the Legislature of New Jersey, or the National Congress, for extending the road from the State line to the seaboard, where extensive improvements would be erected and add greatly to the value of its taxable property, and therefore present strong claims for liberal legislation.

The first steps to be taken here, will be to ascertain the actual value of all the coal estates and improvements which will be directly benefitted by the construction of the line, and the amount that can be relied upon for the formation of the trust to secure the payment of the bonds on which the first amount of capital is to be raised. A fair and earnest canvass ought to secure in this way the sum of $2,000,000, which by proper management will give the trade of this region the control of the road; a larger amount would be desirable for many reasons, but in the hands of active financial agents, this would draw the balance of the money needed.

As before remarked, it is possible that one of the present carrying lines in the Lehigh Valley will be ready to receive the tonnage upon satisfactory terms at the mouth of Lizzard Creek; if this should be the case, only a very small per centage of the assessment would be needed to construct the

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first division of the road. It is, however, always best in conducting negotiations to have as strong a case as possible to present, and it will therefore be wisest to work upon the plan embracing the construction of the whole line as an independent road. In any event, it should be made a through traffic line in order to derive the greatest advantages from it, and this should not be lost from view in any arrangements sought to be made with the present carrying companies.

The bonds to be issued for this work may be made payable in gold at a long period, with interest semi-annually, also payable in gold; or they may be eight per cent. bonds interest and principal payable in currency. In the calculations for the cost of transportation, the interest is rated at eight per cent. per annum, and bonds, so well secured as these would be, ought with this rate of interest to sell at par; and if well explained to the public should bear a premium. If the bonds are negotiated to pay interest and principal in gold they should mature at long periods in order to secure the advantages of a resumption of specie payments. If, on the other hand, it should be deemed advisable to pay the indebtedness more rapidly by placing to the sinking fund a larger amount per annum, the currency basis should be adopted with the higher rate of interest.

There are bankers of high repute who would undertake the negotiation of these bonds upon satifactory terms, and it would be wisdom to call in the aid of such persons to advise with in all the financial arrangements.

No extended remarks need be added to what has been already said, to show the productiveness of this enterprise to the producers and consumers of coal, and the owners of its stock and other securities. With such additions to the facilities of transportation as are contemplated in the general plan of a through traffic road, with a double track, not less than twelve or fourteen millions of tons per annum could be moved over this road without crowding it, provided ample means for handling such an amount are furnished at the terminal points. With careful inspection of rolling stock, accidents would be avoided at the slow speeds which it is proposed to adopt, and all confusion of running trains which

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often follows accidents would be unknown. This plan of operating a road is the only one, where a constant increase in the number of trains moving at one time to the utmost capacity of the road, is followed by a positive diminution of working expenses.

There are many interesting features of this plan which cannot be presented here for want of space; these will readily suggest themselves to all familiar with coal transportation, and aid in commending it to the attention of those most deeply interested in its adoption.

In concluding this report I desire to state that the service rendered by me in directing the surveys, has been without compensation, and I only regret that the means at my disposal for defraying the expense of the party in the field did not admit of more extended explorations to further develop this important work. It is hoped that enough has been done to awaken sufficient interest in the enterprise to cause the necessary steps to be taken towards an organization of the means within the reach of the trade to carry it forward to ultimate success.

My thanks are due Mr. James Thompson, civil engineer, and the members of his party in the field, for faithful and efficient services in making the surveys. To gentlemen in this County, and along the route of the surveys, both in Pennsylvania and New Jersey, we are indebted for many courtesies and valuable information.

Respectfully submitted,

R. A. WILDER.

CRESSONA, SCHUYL. CO., PA.,
September 1st, 1868.

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mitted to them, and in relation to which they are authorized to inquire in pursuance of the provisions of this Act, and having viewed the premises, they shall estimate and determine the quantity, quality, and value of said lands so taken or occupied, or to be so taken or occupied, or the materials so used or taken away, as the case may be, and having a due regard to and making just allowance for the advantages which may have resulted, or which may seem likely to resut to the owner or owners of said land or materials, in consequence of the making or opening of said Railroad, and of the construction of works connected therewith; and after having made a fair and just comparison of said advantages and disadvantages, they shall estimate and determine whether any, and if any, what amount of damages has been or may be sustained, and to whom payable, and make report thereof to the said Court; and if any damages be awarded, and the report be confirmed by the said Court, judgment shall be entered thereon; and if the amount thereof be not paid within thirty days after the entry of such judgment, execution may then issue thereon as in other cases of debt, for the sum so awarded, and the costs and expenses incurred shall be defrayed by the said Railroad company; and each of said viewers shall be entitled to one dollar and fifty cents per day for every day necessarily employed in the performance of the duties herein prescribed, to be paid by such Railroad company.

AREA OF COAL FIELDS.

The following is the area in square miles, together with the thickness of the coal seams, and the number of acres in the different coal fields. taken from the book called "Coal, Iron and Oil," recently published by Daddow and Bannan:

Regions.	Area in square miles.	Coal—Thickness in ft.	No. acres
Schuylkill Region, - - -	180	100	115,200
Lehigh Region, - - -	44	50	23,166
Shamokin Region, - - -	50	70	32,000
Lackawanna Region, - -	100	60	64,000
Wyoming Region, - - -	98	100	62,720

DISTANCES.

The distance from Pottsville to New York via the Philadelphia and Reading Railroad, and the Delaware and Raritan Canal, is 196 miles. Via the Schuylkill Navigation Company's Canal and the Delaware and Raritan Canal, 226 miles.

From Pottsville to Perth Amboy by the route examined in this report, 127.7 miles.

The freights East and to New York from Perth Amboy will be the same as from Elizabethport and Port Johnson.

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